

## PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO FABRICS  
 PRIMARILY FOR USE AS CARPET BACKINGS

(71) We, H. & A. SCOTT LIMITED, a British Company of 33, Seafield Road, Dundee DD1 4NL, Scotland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns improvements in or relating to fabrics primarily for use as carpet backings.

In the manufacture of tufted pile fabrics, a primary backing is used and the tufted product is obtained by sewing or passing the tufting yarn, for example, comprising natural, made-made fibres or blends thereof, systematically back and forth through the primary backing with the formation of a pile or yarn loops on the top face of the backing. These loops may be cut or left uncut as desired.

After the tufting operation has been completed, an adhesive coating, for example, of latex, is normally applied to that surface of the backing remote from the tufts in order to retain or lock the tufted yarn in position. A secondary backing material may or may not be applied to obtain the finished product.

The use of polypropylene tapes or ribbons for use in making woven primary carpet backings has been extensive, such conventional woven polypropylene primary carpet backings consisting of tapes or ribbons having a generally flat cross-sectional shape and being used both for the warp and the weft.

Whilst the use of polypropylene tapes or ribbons for this purpose is advantageous because the tapes and ribbons are relatively inexpensive, the use of such tapes or ribbons gives rise to a number of disadvantages.

Thus, one such disadvantage is that polypropylene is not readily dyeable so that, where it is used to provide a primary carpet backing of a particular colour, for example to match

the colour of a tufting yarn which will be used so that the primary backing will be less visible in the finished carpet when viewed from the tufted side, it is often necessary to produce polypropylene primary carpet backings made from pigmented or otherwise coloured tapes or ribbons which gives rise to expense, particularly if such primary carpet backings are required in a wide range of colours when producers of the backings and carpet tufters need to hold large stocks of backings in a variety of colours.

Tufted carpets which have insufficient number of tufts per square inch frequently suffer from a defect known in the trade as "grinning," where the primary carpet backing is visible through the tufts of the carpet. It is to reduce this defect that it has been desirable to produce a polypropylene primary carpet backing made from pigmented or otherwise coloured tape with the inherent disadvantage as referred to hereinbefore. In known carpets, in order to overcome the above mentioned problem of "grinning" the carpet manufacturer frequently has had to use more pile yarn per unit area than he would otherwise have used, again giving rise to expense.

Another disadvantage is that the polypropylene tapes or ribbons suffer damage during the tufting operation which results in some warp damage and severe weft damage leading to a high fabric weft strength loss often in the region of 40% to 70%.

With a view to trying to minimise damage during the tufting operation, it has been found advantageous to lubricate polypropylene primary backing fabrics so that the needle used in the tufting operation slide move easily through the polypropylene tapes or ribbons, but again such lubrication gives rise to added expense.

A still further disadvantage is that, because polypropylene has a relatively inert chemical composition, it is difficult to find adhesives which will adequately adhere thereto

in order to retain or lock the tufted yarn in position, the use of an adhesive being desirable not only to lock or hold the yarn in position but also in order to anchor a secondary backing to the tufted carpet. The adhesive most widely used is either a natural or synthetic latex but, because polypropylene has a relatively low melting point, the carpet manufacturer has been forced to dry and/or cure the latex at a relatively low temperature in the region of 130° C. which gives rise either to slow processing speeds or the use of very long and expensive ovens.

It is an object of the present invention to provide a fabric primarily for use as a carpet backing which overcomes or reduces the aforesaid disadvantages of known polypropylene tape carpet backings.

Viewed from one aspect, the invention provides a fabric primarily for use as a carpet backing, such fabric comprising a woven material of which the warp comprises transparent or translucent polyolefin tapes or ribbons, and of which the weft comprises continuous multifilament, dyeable, synthetic yarns, so that, when the weft is dyed, the colour to which the weft yarns are dyed is visible through those portions of the transparent translucent tapes or ribbons which are superimposed on the weft.

The hereinbefore mentioned continuous, multifilament, dyeable, synthetic yarn may or may not be bulked.

Thus, viewed from a further aspect the invention provides a method of producing a carpet, such method comprising producing a primary backing by weaving a fabric using as the warp transparent or translucent polyolefin tapes or ribbons and for the weft a continuous multifilament, dyeable, synthetic yarn, effecting a tufting operation using a suitable dyeable yarn and thereafter dyeing the tufted backing fabric thus produced, the colour to which the weft yarns are dyed being visible through those portions of the said tapes or ribbons which are superimposed on the weft.

Thus, it will be appreciated that, where the fabric of the invention is used as a primary carpet backing, then the backing may be woven, the tufting operation may be effected and then the primary backing carrying the tufts may be dyed in one operation so that the primary backing may be the same or very similar shade of colour to that of the tufts thereby reducing the defect of "grinning" as referred to hereinbefore.

Moreover, if in producing the primary carpet backing a dye variant weft yarn is used, i.e. a yarn which has been modified in such a way that its dye uptake differs from conventionally produced yarns, then it is possible in a single dyeing operation to dye the carpet backing a different shade from that of the pile yarn. Thus if the primary backing is of a darker and contrasting colour to that of the pile yarn, the "grinning" effect may be further reduced.

The fabric of the invention may be used not only as a primary carpet backing but also as a secondary carpet backing in which case the fabric of the present invention gives rise to a further advantage in that the handle and appearance of the under surface of the carpet finally produced is, in our opinion, improved. The fabric of this invention also gives better frictional contact with the surface on which the carpet is laid as compared with a carpet having a secondary backing fabric consisting solely of polypropylene tapes or ribbons.

The fabric of the invention has the following advantages for example when used as a primary and/or secondary backing for carpets:—

- a) the weft of the fabric is dyeable with a range of dyestuffs, and the colour of the dyed weft material shows through the tapes or ribbons. A carpet can therefore be constructed using the fabric of the invention where the pile yarn and the weft in the primary backing can be simultaneously dyed to the same depth of colour or alternatively simultaneously dyed to give a differing depth of colour to the backing and the pile yarn. This reduces the problem of "grinning" of the primary backing through the carpet pile yarn. 70
- b) If the primary carpet backing weft yarn and the carpet pile yarn consist of the same fibre but one or other is modified such that it is a dye variant yarn then it is possible to dye the weft of the carpet backing to a different shade of colour from that of the pile yarn in a single operation. As indicated above it has been found that if the primary backing is of a darker and contrasting colour to that of the pile yarn the "grinning" effect is reduced. 75
- c) As the weft material of the carpet backing in accordance with the invention consists of a multifilament yarn, the tufting needles readily penetrate the weft material reducing the amount of damage encountered as compared with the damage sustained in using flat polypropylene tapes or ribbons as the weft. 80
- d) When the fabric of the invention is used as a primary carpet backing there is reduced damage to the weft of the fabric during tufting compared to the damage suffered by a weft consisting of tapes or ribbons and it is then unnecessary to apply a lubricant to the surface of the fabric and expense is avoided. 85
- e) By using a continuous, multifilament synthetic, weft yarn, particularly if bulked so as to have rather an open construction, or being formed so as to have threads laterally extending therefrom, adhesion of the tufted pile to the primary backing and of a secondary backing to the carpet is improved. Because of this improved adhesion, it has been found 90

possible to use less sophisticated and hence less expensive latex compositions, and the product is virtually non-fray.

- 5 f) Use of continuous, multifilament, synthetic, weft yarn having a relatively high melting point, for example, polyester or polyamide which melt at temperatures in the region of 260° C.—that is about 100° C. above the melting point of polypropylene tapes or ribbons—result in a primary backing fabric having a reduced weft shrinkage potential at the temperatures normally used for drying and curing latex coatings on tufted carpets. Manufacturers of tufted carpets can therefore in using the fabric of the present invention as a primary backing material operate their drying ovens at higher temperatures enabling the carpet manufacturer to cure and/or dry the latex in a shorter time than that achieved when using a polypropylene weft in a primary carpet backing with consequent cost reductions.
- 10 g) It will be appreciated that, in producing the preferred fabric in accordance with the invention, it is to the manufacturer's advantage to use transparent or translucent polypropylene warp tapes or ribbons so that the weft material when dyed will be visible through those portions of the weft which are overlapped by the warp yarns. This means that, whereas in the past, manufacturers of woven primary backing materials have employed pigmented or otherwise coloured polypropylene tapes or ribbons, the cost of such pigments and colouring can be avoided by use of the present invention.
- 15 h) As has been made clear above the disadvantage of "grinning" can be overcome or reduced by using the fabric of the present invention. It is also possible in appropriate cases to use less pile yarn than was previously possible when the carpet backing consisted entirely of polypropylene tapes or ribbons in both warp and weft directions, thereby again reducing expense.
- 20 i) If bulked yarns are used as weft the car-

pet manufacturer can more easily adjust the final width of the tufted carpet during latexing and curing in his drying ovens.

- 55 j) If bulked yarns are used as weft the inherent resilience of the primary carpet backing allows easier processing during the tufting operation. Wrinkles do not readily form as is often the case in carpet backing fabrics comprised wholly of polypropylene. 60

The invention also extends to carpets when made by the method of the invention, and to carpets incorporating the fabric of the invention as a primary and/or secondary backing. 65

In order that the invention may be more readily understood one embodiment of the fabric thereof for use as a primary and secondary carpet backing will now be described by way of example and with reference to the accompanying drawing in which:— 70

FIGURE 1 is a plan view of a woven fabric in accordance with one embodiment of the invention; and

FIGURE 2 is a vertical section through a carpet in accordance with an embodiment of the invention and of which the primary and secondary backings comprise the fabric of Figure 1. 75

In this embodiment, a woven fabric is prepared by conventional means using, as the warp 1, non-pigmented, transparent, 1000 denier polypropylene tapes or ribbons and, as the weft 2, a dyeable bulked continuous multifilament nylon 6.6 yarn, 800 denier, that is, nylon which can be dyed. The count of the fabric is 9½ warp ends per inch and 15 piles per inch. 80

This fabric thus produced is used as a primary backing 3 for a carpet, a tufted product being obtained by sewing or passing a dyeable 2600 denier nylon 6.6 tufting 4 systematically back and forth through the primary backing 3, using a tufting machine having needles set ¼" apart, with the formation of a pile or yarn loops which may or may not be cut. 90

The rate at which tufting takes place is arranged so that 7, 10 and 13 rows of loops are formed per inch of primary backing fabric.

Measurements of the breaking load of the fabric before and after tufting are as follows:— 100

$9\frac{1}{2} \times 15$   $\left\{ \begin{array}{l} 800 \text{ denier} \text{ Bulkcd nylon weft} \\ 1000 \text{ denier} \text{ Polypropylene 2.5 mm tape warp} \end{array} \right.$

No. of rows per inch	Breaking load in Kg before tufting *		Breaking load in Kg after tufting **		Percentage Strength loss resulting from Tufting	
	Warp	Weft	Warp	Weft	Warp	Weft
7			43	78	32	16
10	63	93	38	75	40	19
13			37	69	41	26

\* test results taken on an Instron tensile tester using samples 2 inches wide, 10 inches long (between grips) and a rate of extension of 100% per minute.

\*\* polypropylene non-lubricated

5 The tufting needles used in the tufting operation can readily penetrate or avoid the weft material of the weft yarn so that the loss of fabric weft strength is less than the loss in the region of 40% to 70% in the case where the weft yarns were formed from polypropylene tapes or ribbons. For comparison, measurements of the breaking load of polypropylene before and after 10 tufting are as follows:—

$9\frac{1}{2} \times 10$   $\left\{ \begin{array}{l} 1000 \text{ denier Polypropylene 2.5 mm tape warp} \\ 1000 \text{ denier Polypropylene 2.5 mm tape weft} \end{array} \right.$

No. of rows per inch.	Breaking load in Kg before tufting		Breaking load in Kg after tufting **		Percentage strength loss resulting from tufting	
	Warp	Weft	Warp	Weft	Warp	Weft
7			52	25	31	55
10	75	55	48	24	36	56
13			42	21	44	62

\*\* Polypropylene non-lubricated in both cases.

15 Again the test results were taken on an Instron tensile tester using samples two inches wide, ten inches long and a rate of extension of 100% per minute.

20 Subsequent to tufting, the carpet thus produced is dyed. The tufted pile and the weft 2 of the primary backing 3 take up the colour of the dye and where the warp 1 overlaps the

weft 2 on that surface of the backing material from which the tuft extends, the coloured weft is visible through the transparent warp and hence the overall visual colour appearance of the primary backing material approximates to the colour of the weft and the pile yarn. 25

The carpet thus produced has a reduced "grinning" defect.

That surface of the primary backing 3 remote from the tufts is then treated with a latex adhesive 5 in order to anchor the pile yarns in position and, at the same time, a secondary backing 6 in the form of the fabric produced in accordance with this embodiment is attached to that surface of the primary backing 3 remote from the tufting through the intermediary of the latex adhesive 5.

It will be appreciated that the latex or other adhesive gives improved adhesion to the primary and secondary backings because the adhesion is assisted by mechanical interlocking of the adhesive with the bulked nylon 6.6 yarns.

Moreover, the undersurface of the carpet thus produced has an improved handle and appearance and makes improved frictional contact with a surface for instance wooden floor or underlay, on which the carpet is laid compared with a secondary backing consisting of a fabric using polypropylene tapes or ribbons solely.

WHAT WE CLAIM IS:—

1. A fabric primarily for use as a carpet backing, such fabric comprising a woven material of which the warp comprises transparent or translucent polyolefin tapes or ribbons, and of which the weft comprises continuous multifilament, dyeable, synthetic yarns, so that, when the weft is dyed, the colour to which the weft yarns are dyed is visible through those portions of the transparent or translucent tapes or ribbons which are superimposed on the weft.

2. A fabric according to claim 1, wherein the said continuous multifilament dyeable synthetic yarn is bulked.

3. A fabric according to claim 1 or 2, wherein the said polyolefin is polypropylene.

4. A method of producing a carpet, such method comprising producing a primary backing by weaving a fabric using as the warp transparent or translucent polyolefin tapes or ribbons and for the weft a continuous multifilament, dyeable, synthetic yarn, effecting a tufting operation using a suitable dyeable yarn and thereafter dyeing the tufted backing fabric thus produced, the colour to which the weft yarns are dyed being visible through those portions of the said tapes or ribbons which are superimposed on the weft.

5. A method of producing a carpet substantially as hereinbefore described with reference to the accompanying drawing.

6. A fabric according to claim 1, substantially as hereinbefore described with reference to and as shown in Figure 1 of the accompanying drawing.

7. A carpet, substantially as hereinbefore described with reference to and as shown in Figure 2 of the accompanying drawing.

8. A carpet when made using the method of claim 4 or 5.

9. A carpet incorporating the fabric of any one of claims 1 to 3 or 6 as a primary and/or secondary backing.

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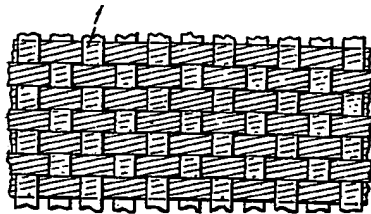


Fig. 1.

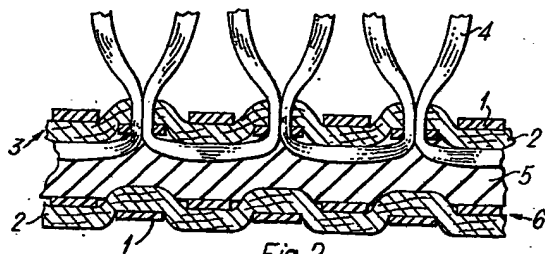


Fig. 2.